Microgravity investigations in the physics of fluids using acoustic techniques. Eugene H. Trinh (Jet Propulsion Laboratory, MS 183-401, California Institute of Technology, Pasadena 91109)

The Earth gravitational field strongly affects the motion of extended liquid surfaces, it establishes unavoidable density gradients, and it leads to the segregation of immiscible fluids having different density. Accessing a low gravity environment introduces the opportunity to investigate the effects of low-magnitude capillary and thermo-capillary forces in systems such as two and three dimensional free liquid surfaces (drops, bubbles, and floating zones) and stable multi-phase samples. Acoustic methods have already been shown to be effective in allowing the contactless positioning and manipulation of drops and bubbles in low gravity, as the other presentations in this session demonstrate. This sucessful implementation of acoustics to space-based research is currently represented by the Drop Physics Module flight facility for microgravity experiments. There is, however, additional opportunity for the application of advanced quantitative acoustic measurement techniques for the determination of the properties of fluid phases or for the management of fluids in low gravity. Experiments in microgravity require a variety of novel supporting capabilitites, and acoustics could provide some viable initial approaches. On the other hand, the observation of strictly acoustic effects such as streaming, cavitation, and radiation pressure in the reduced gravity environment might also provide new clues useful for the understanding of these phenomena. [Work supported by NASA]

Invited for special session on Acoustics in Space

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